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(54) **WALL-MOUNTED CONTROL SYSTEM FOR A PORTABLE TOUCH SCREEN DEVICE**

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Related U.S. Application Data

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(60) Provisional application No. 61/385,211, filed on Sep. 22, 2010.

(51) **Int. Cl.**

G05B 11/01	(2006.01)
G06F 3/041	(2006.01)
F16M 11/04	(2006.01)
F16M 13/00	(2006.01)
F16M 13/02	(2006.01)
G06F 1/16	(2006.01)
G08C 17/02	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/0416*** (2013.01); ***F16M 11/041*** (2013.01); ***F16M 13/00*** (2013.01); ***F16M 13/02*** (2013.01); ***G06F 1/1626*** (2013.01); ***G06F 1/1632*** (2013.01); ***G08C 17/02*** (2013.01)

(58) **Field of Classification Search**

CPC F16M 11/041; G06F 1/1632
USPC 340/12.5, 12.51, 12.52, 12.53, 12.54, 340/12.55, 12.22, 13.24; 710/73, 300, 105, 710/303, 304, 218; 361/681, 679.41, 361/679.42, 679.43, 679.55

See application file for complete search history.

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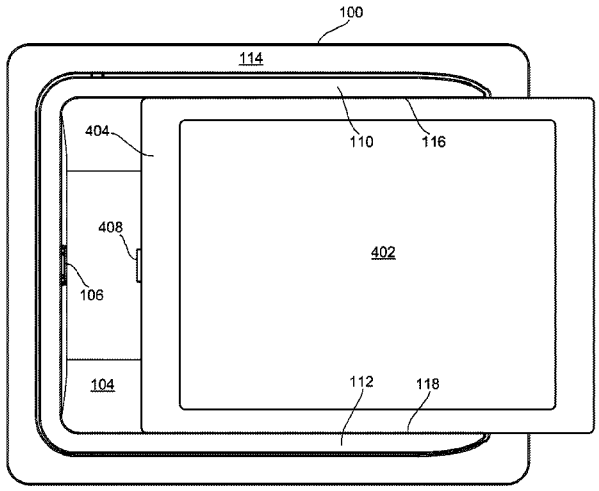
(57) **ABSTRACT**

Presented is a wall-mounted control system for a portable touch screen device. The control system includes a housing, a touch screen mounting member moveably coupled to the housing and configured to releasably hold the portable touch screen device, a processor configured for providing an interface between the portable touch screen device and one or more remote systems, a docking connector configured for electrically mating with the portable touch screen device and establishing electrical communication between the processor and the portable touch screen device, and a communication circuitry configured for establishing communication between the processor the one or more remote systems.

3 Claims, 9 Drawing Sheets



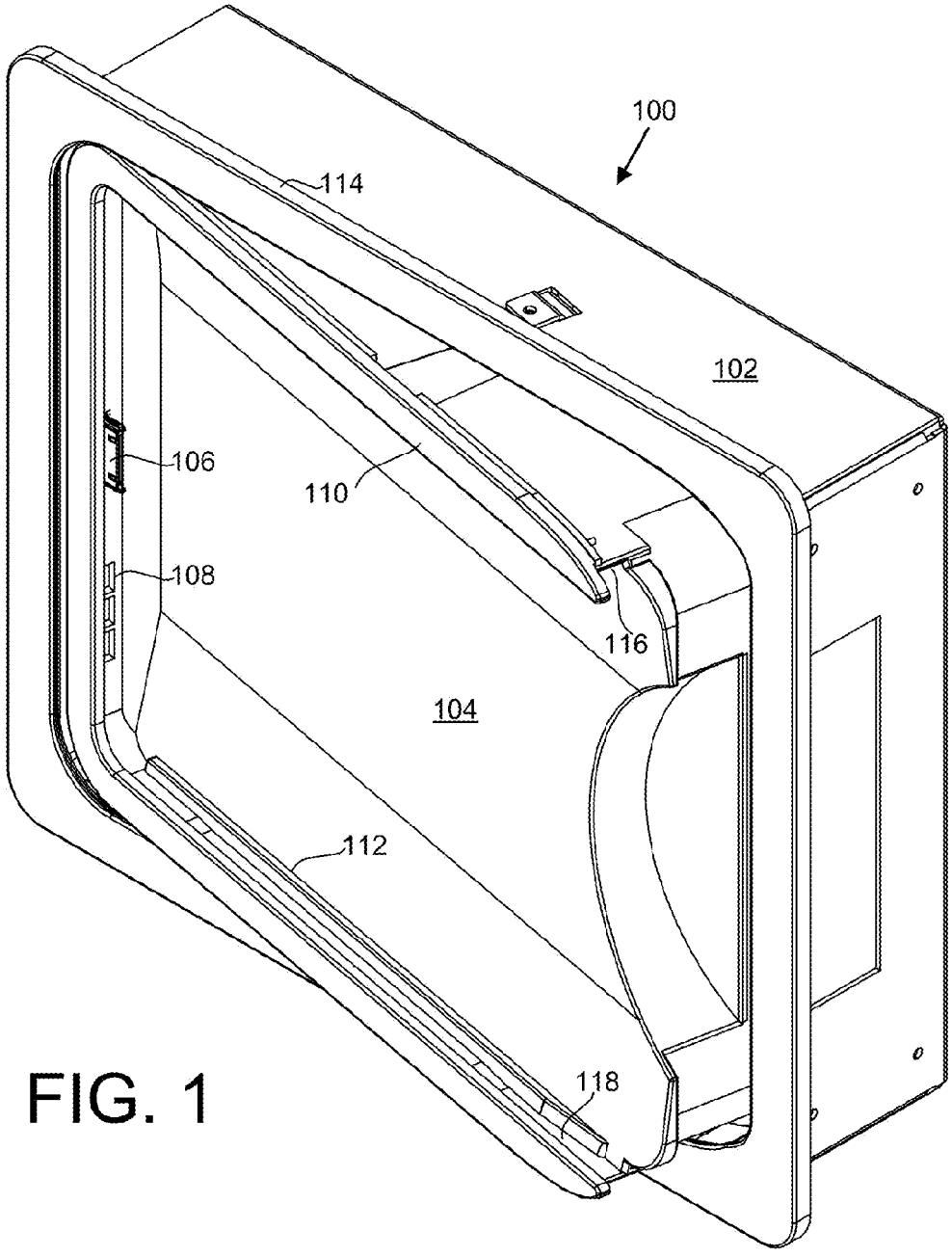


FIG. 1

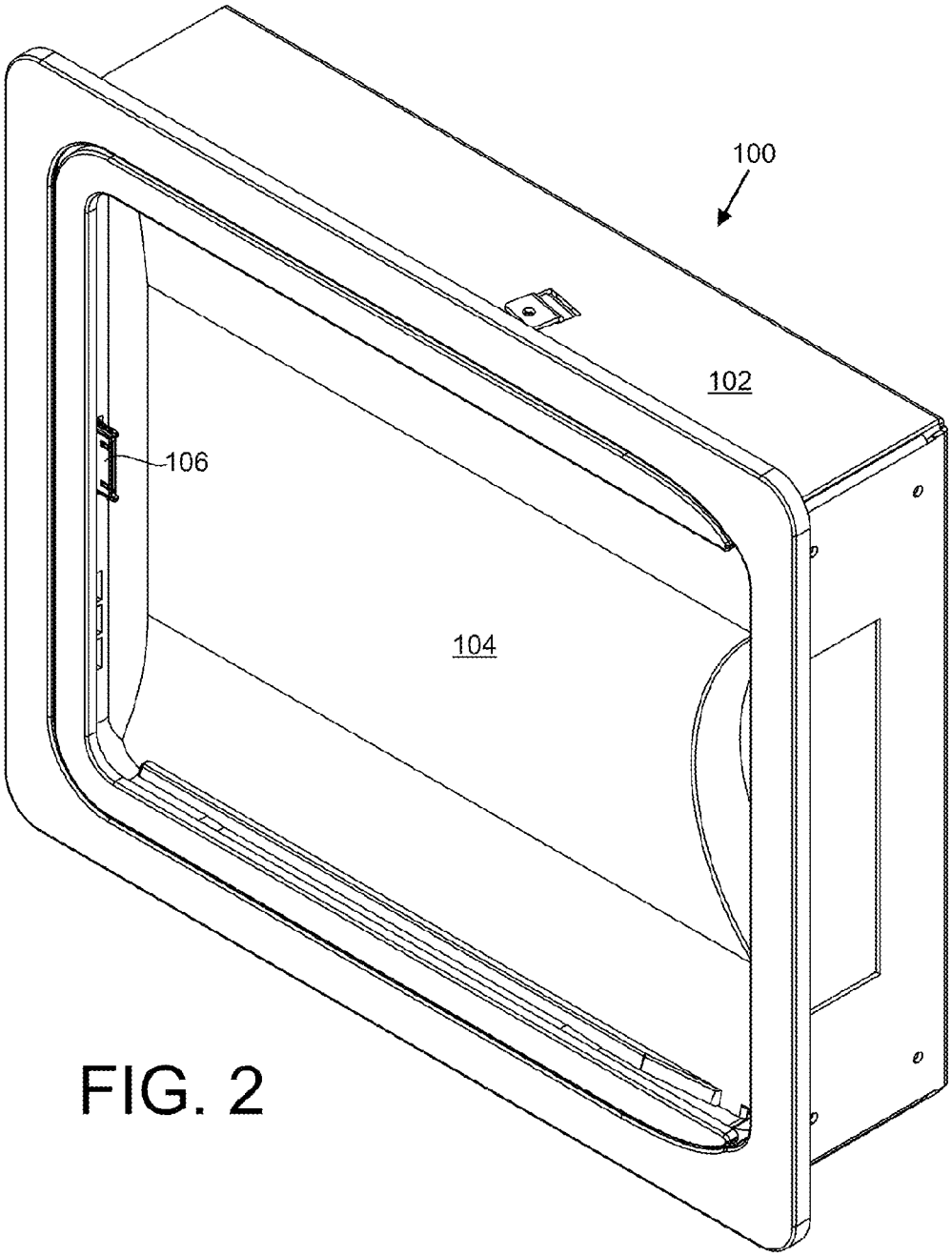


FIG. 2

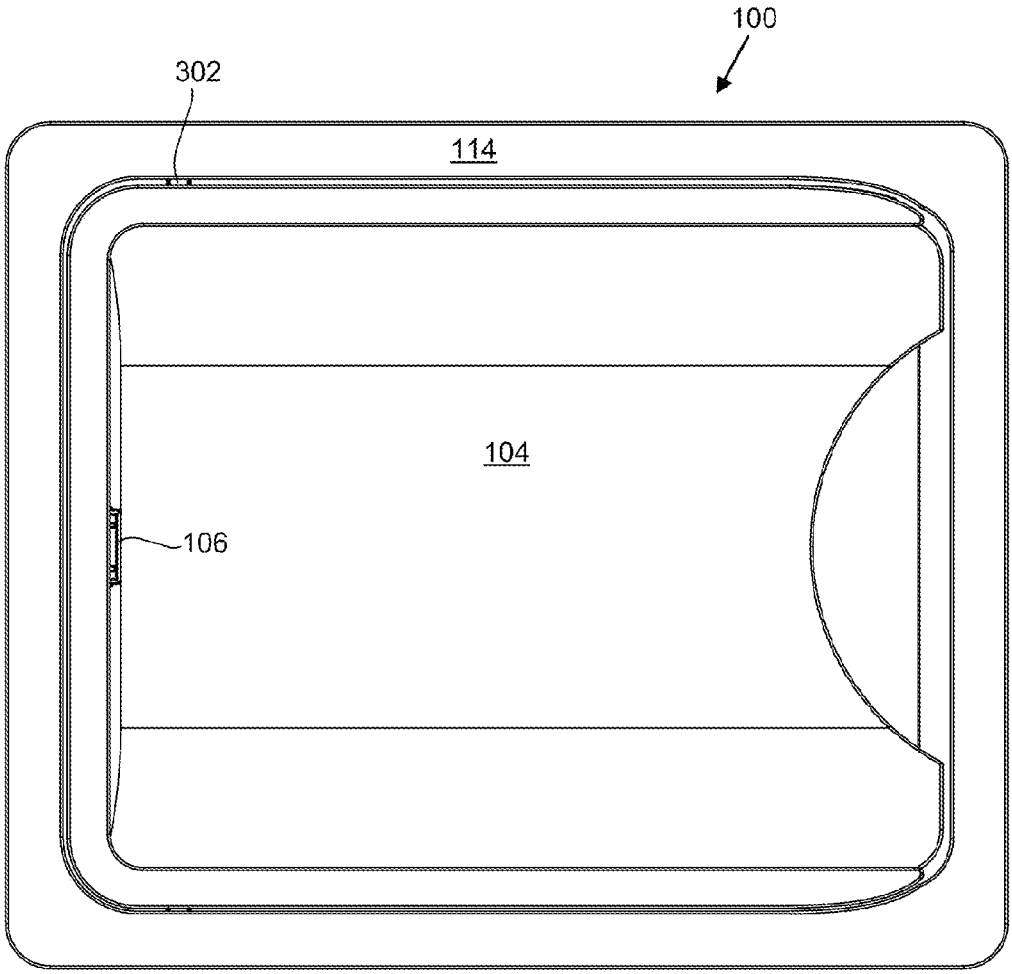


FIG. 3

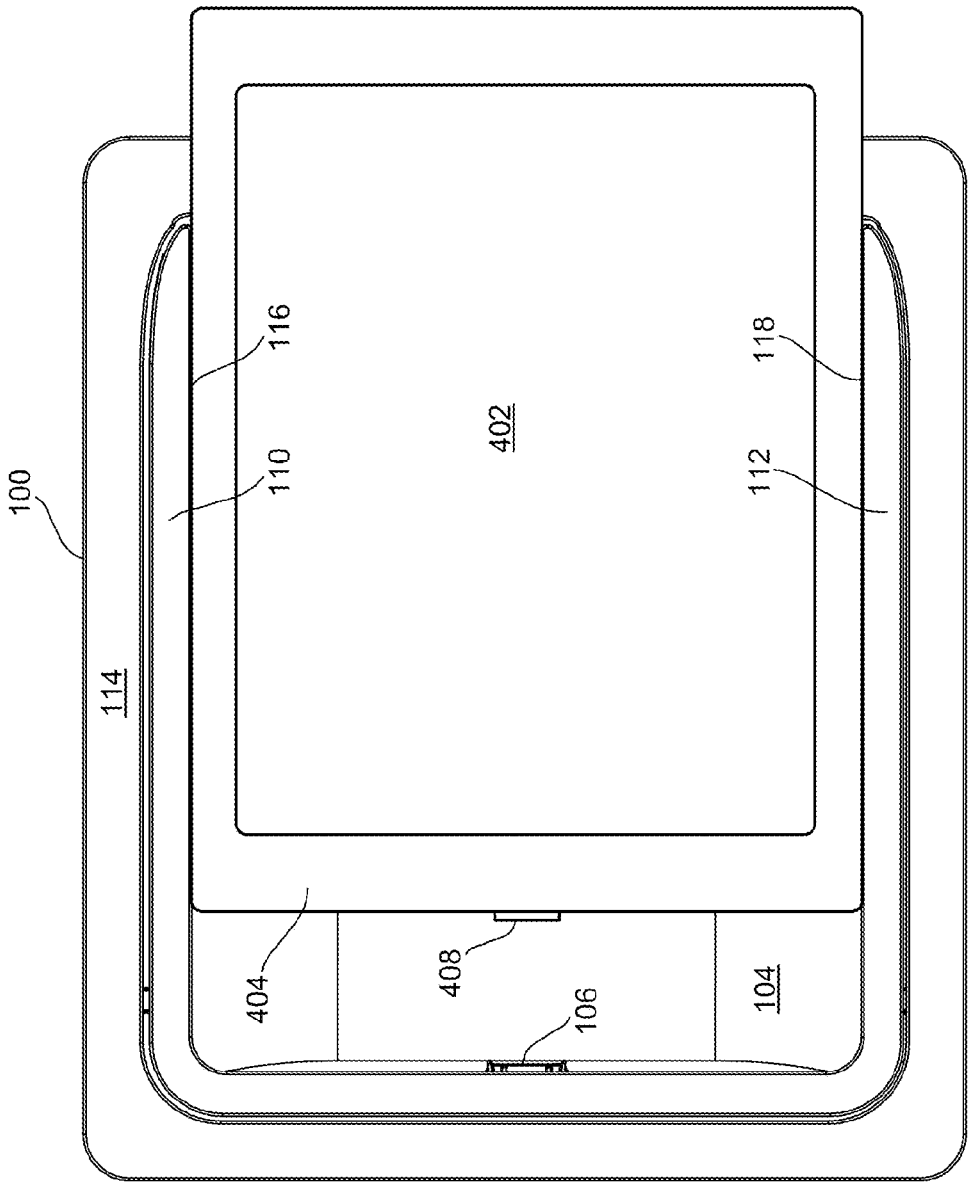


FIG. 4

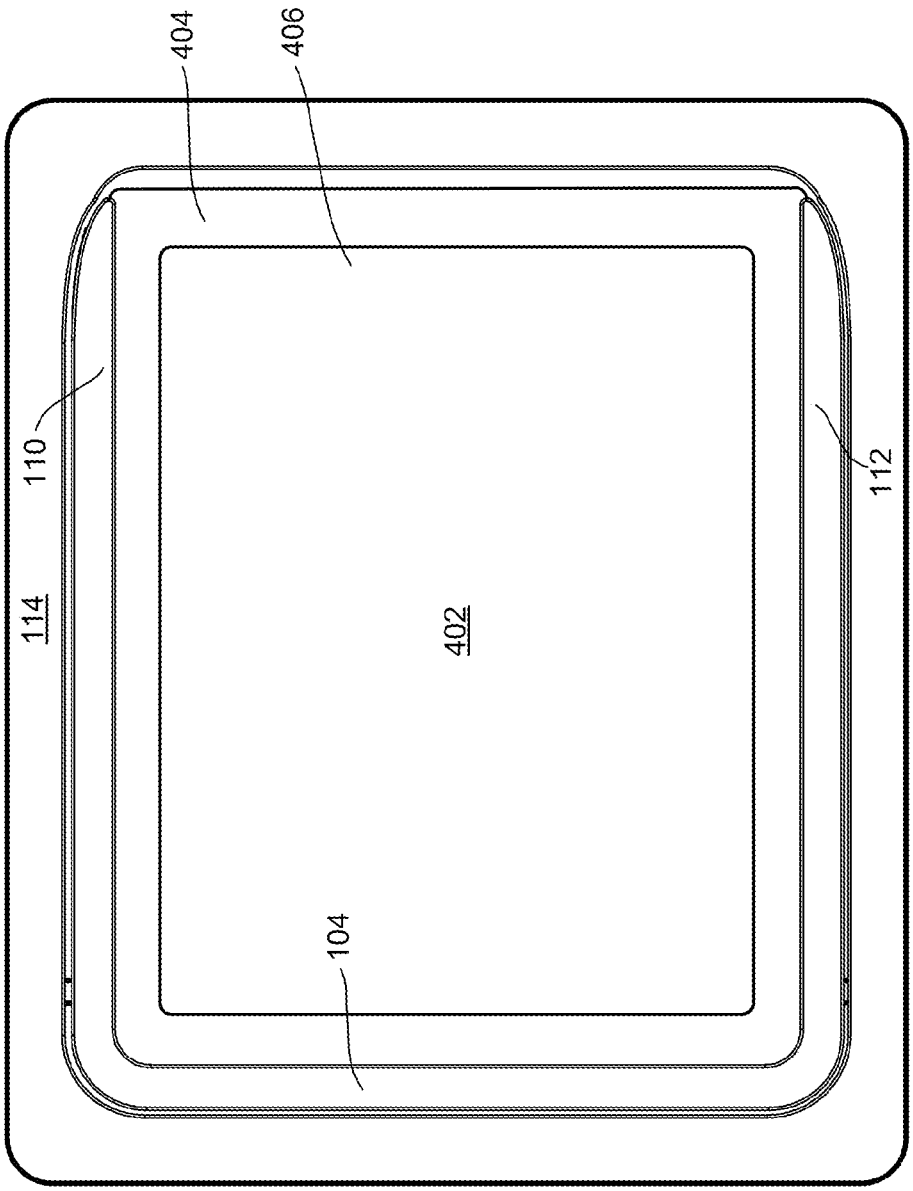


FIG. 5

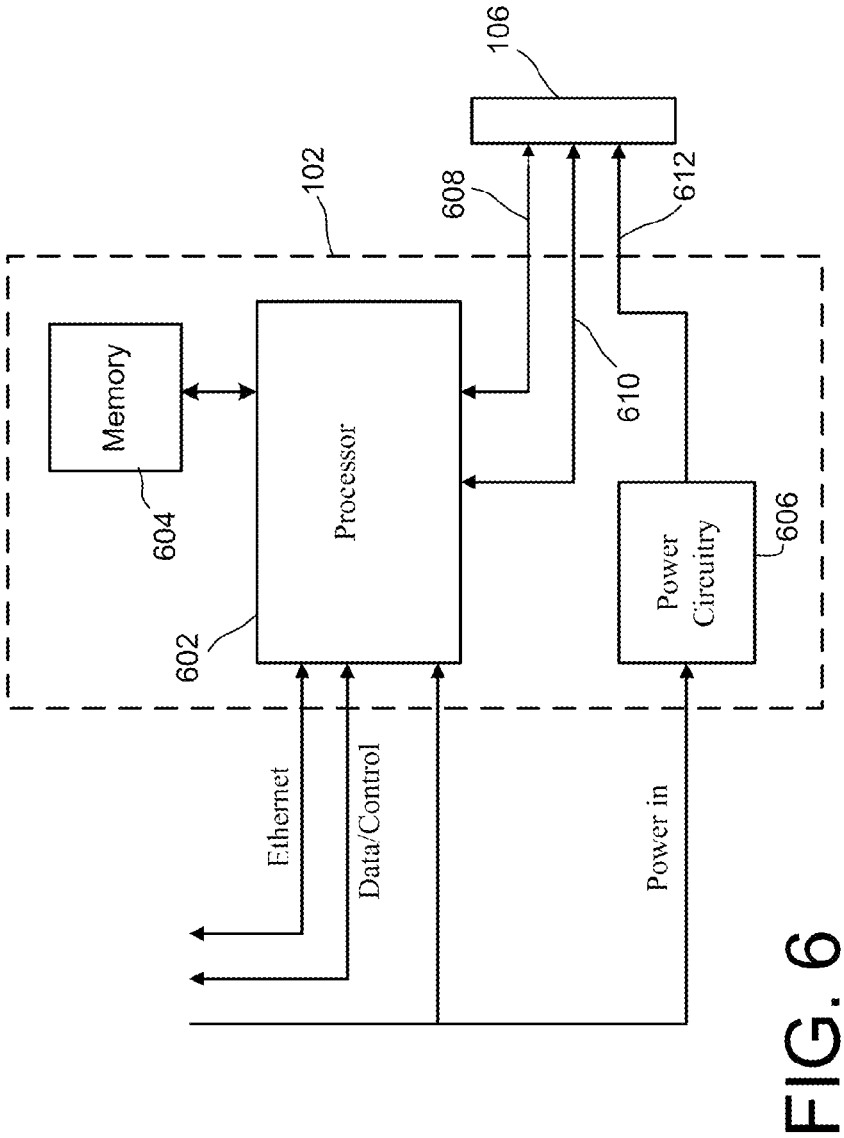

106
102
608
612
Memory
Processor
610
604
602
Power Circuitry
606
Ethernet
Data/Control
Power in

FIG. 6

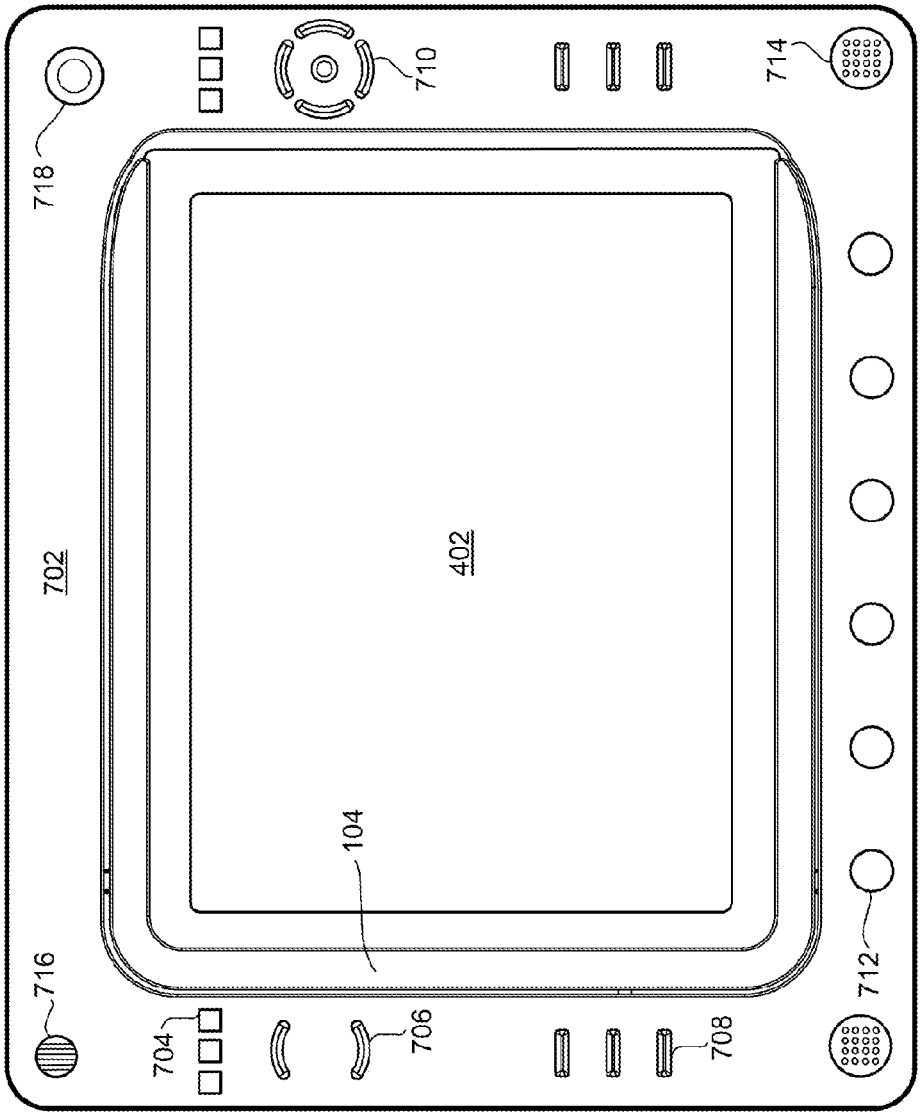


FIG. 7

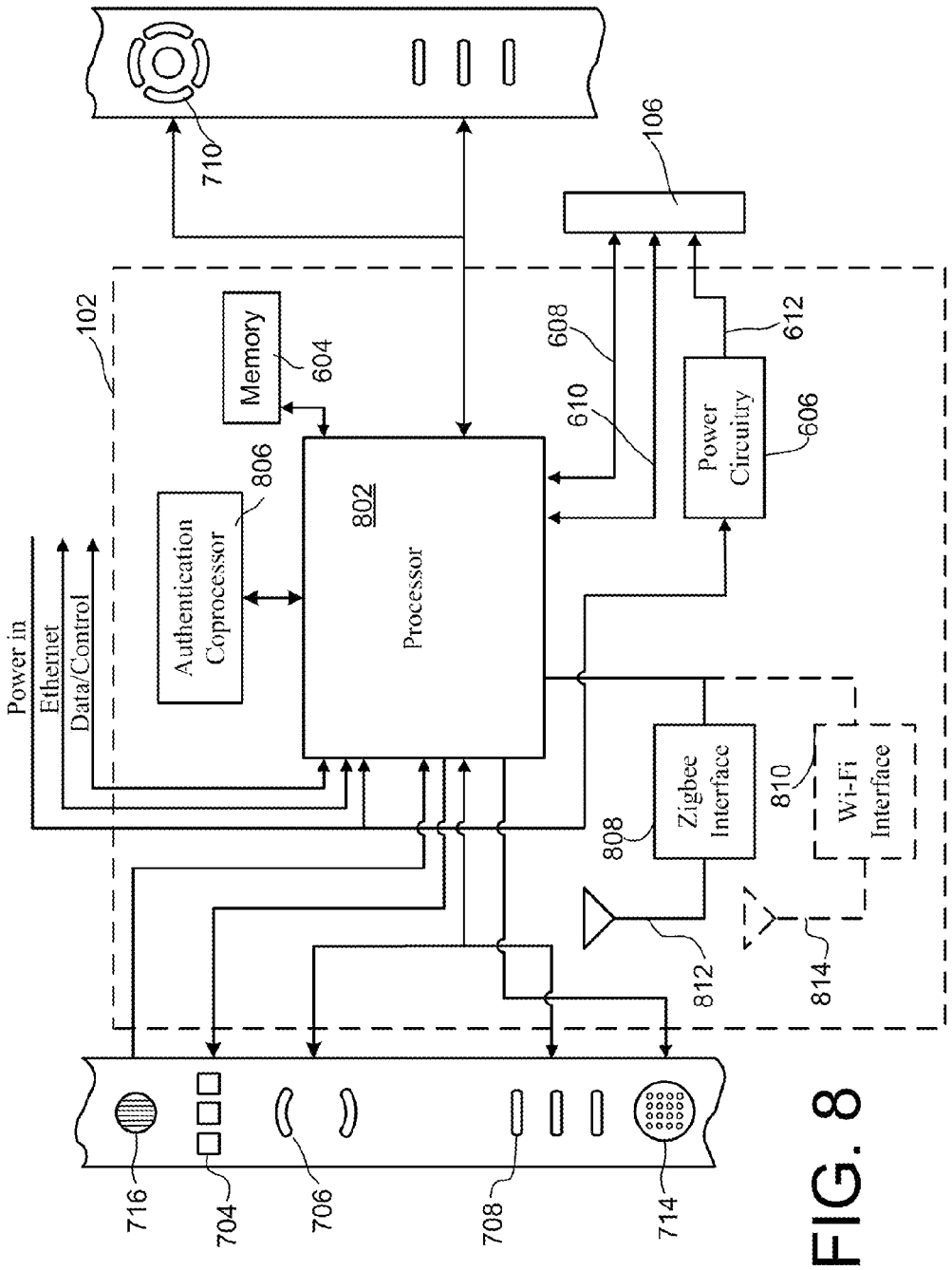

710
106
102
Memory
604
608
612
610
Power Circuitry
606
806
802
Processor
Authentication Coprocessor
Power in
Ethernet
Data/Control
Zigbee Interface
808
810
Wi-Fi Interface
812
814
716
704
706
708
714

FIG. 8

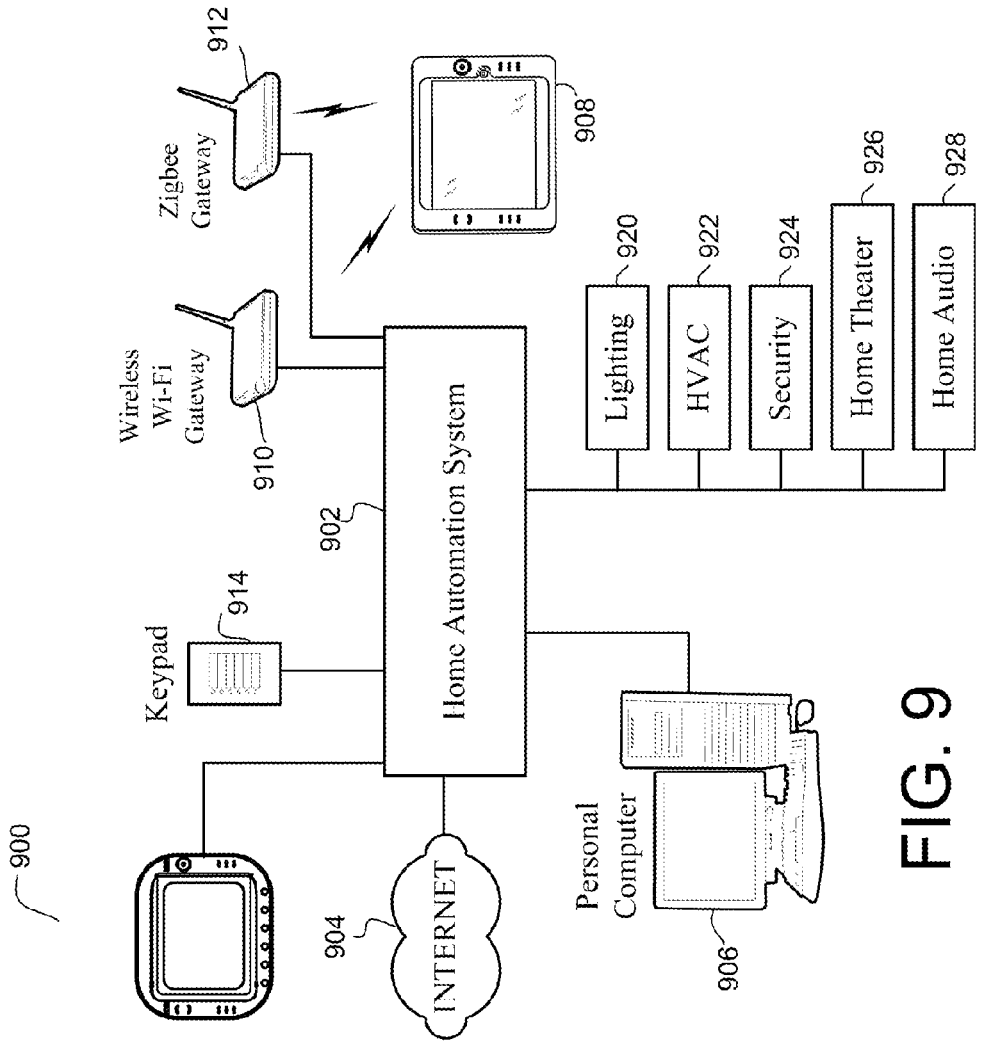

900
912
Zigbee Gateway
908
Wireless Wi-Fi Gateway
910
902
Home Automation System
Lighting
920
HVAC
922
Security
924
Home Theater
926
Home Audio
928
Keypad
914
904
INTERNET
Personal Computer
906

FIG. 9

WALL-MOUNTED CONTROL SYSTEM FOR A PORTABLE TOUCH SCREEN DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 29/367,201, filed Aug. 4, 2010. This application also claims priority to and the benefit of U.S. Provisional Patent Application Ser. No. 61/385,211, filed on Sep. 22, 2010, the entirety of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates generally to portable hand-held electronic touch screen devices such as smart phones, electronic book readers, and tablet computers, and more particularly to wall-mounting such devices, integrating such devices with various control and automation systems, and augmenting these devices with various external manual hard buttons and/or actuators and/or indicators.

2. Background Art

In the field of control and automation, custom designed and programmed wall-mounted touch panels provide a sophisticated means for interfacing and controlling home theater, lighting, environmental, and security systems. However, such custom wall-mounted touch panels are very expensive in comparison to the various commercially available mass-produced portable hand-held electronic touch screen devices, such smart phones, electronic book (eBook) readers, and tablet computers.

Many such touch screen devices employ a touch screen interface along with generic manual controls and/or actuators, while other smart touch screen devices employ a touch screen interface alone. Further, these smart touch screen devices are capable of executing various third-party applications (i.e., computer programs) that perform a variety of functions (e.g., play music, show video, etc.). However, these smart touch screen devices are not wall-mountable and do not readily interface with, and control, home theater, lighting, environmental, and/or security systems.

Consequently, there exists a need for a system that enables any of the inexpensive commercially available mass-produced hand-held electronic touch screen devices to be removeably mounted to a wall and interface with, and control, home theater, lighting, environmental, and/or security systems.

SUMMARY OF THE INVENTION

It is to be understood that both the general and detailed descriptions that follow are exemplary and explanatory only and are not restrictive of the invention.

DISCLOSURE OF INVENTION

In one aspect, the invention involves a wall-mounted control system for a portable touch screen device. The control system includes a housing, a touch screen mounting member moveably coupled to the housing and configured to releasably hold the portable touch screen device, a processor configured for providing an interface between the portable touch screen device and one or more remote systems, a docking connector configured for electrically mating with the portable touch screen device and establishing electrical communication between the processor and the portable touch screen device, and a communication means configured for establishing communication between the processor the one or more remote systems.

In one embodiment, the control system further includes a plurality of hard buttons, wherein at least one of the plurality of hard buttons is configured for use with an application program executing on the portable touch screen device and at least another one of the plurality of hard buttons is configured to execute a fixed function associated with an external device.

In another embodiment, the communication means includes at least one of a wired Ethernet connection, a wireless Ethernet connection, and a wireless Zigbee connection. In still another embodiment, the communication means further comprises Bluetooth, infiNET, or a proprietary protocol in the ultra high frequency band.

In yet other embodiments, the control system further includes a microphone, at least one speaker, a camera, an authentication coprocessor, circuitry configured for charging a battery disposed in the portable touch screen device, at least one indicator light, a light emitting diode display or a liquid crystal display, and audio and video interfaces configured for transmitting and receiving audio and video.

In still another embodiment, the one or more remote systems include at least one of a home automation system, a home theater system, a lighting system, an environmental control system, or a security system.

In another aspect, the invention involves a wall-mounted control system for a portable touch screen device. The control system includes a housing, a touch screen mounting member moveably coupled to the housing and configured to releasably hold the portable touch screen device, a processor configured for executing a program for interfacing with the portable touch screen device and for controlling and interfacing with one or more remote systems, a docking connector configured for electrically mating with the portable touch screen device and establishing electrical communication between the processor and the portable touch screen device, a communication means configured for establishing communication between the processor the one or more remote systems, and a plurality of hard buttons, at least one of the plurality of hard buttons being configured for use with an application program executing on the portable touch screen device and at least another one of the plurality of hard buttons being configured to execute a fixed function associated with an external device or system.

In still another aspect, the invention involves a wall-mounted control system for a portable touch screen device. The control system includes a housing, a touch screen mounting member moveably coupled to the housing and configured to releasably hold the portable touch screen device, a processor configured for providing an interface between the portable touch screen device and one or more remote systems, a docking connector configured for electrically mating with the portable touch screen device and establishing electrical communication between the processor and the portable touch screen device, a communication means configured for establishing communication between the processor the one or more remote systems, the communication means comprising at least one of a wired Ethernet connection, a wireless Ethernet connection, and a wireless Zigbee connection, and a plurality of hard buttons, at least one of the plurality of hard buttons being configured for use with an application program executing on the portable touch screen device and at least another one of the plurality of hard buttons being configured to execute a fixed function associated with an external device or system.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying figures further illustrate the present invention. Exemplary embodiments are illustrated in reference figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered to illustrative rather than limiting.

The components in the drawings are not necessarily drawn to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention. In the drawings, like reference numerals designate corresponding parts throughout the several views.

FIG. **1** is an illustrative isometric view of an open wall-mounted control system for a touch screen device, according to one embodiment of the invention.

FIG. **2** is an illustrative isometric view of a closed wall-mounted control system for a touch screen device, according to one embodiment of the invention.

FIG. **3** is an illustrative orthographic front view of a wall-mounted control system for a touch screen device, according to one embodiment of the invention.

FIG. **4** is an illustrative orthographic front view of the wall-mounted control system of FIG. **3** including a portable touch screen device partially disposed therein, according to one embodiment of the invention.

FIG. **5** is an illustrative orthographic front view of the wall-mounted control system of FIG. **3** including a portable touch screen device completely disposed therein, according to one embodiment of the invention.

FIG. **6** is an illustrative block diagram of the electronic components disposed in the wall-mounted control system, according to one embodiment of the invention.

FIG. **7** is an illustrative orthographic front view of a wall-mounted control system that includes various hard buttons, according to another embodiment of the invention.

FIG. **8** is an illustrative block diagram of the electronic components disposed in the wall-mounted control system, according to another embodiment of the invention.

FIG. **9** is an illustrative block diagram of a plurality of devices in communication with a home automation system, according to one embodiment of the invention.

LIST OF REFERENCE NUMBERS FOR THE MAJOR ELEMENTS IN THE DRAWING

The following is a list of the major elements in the drawings in numerical order.

100 wall-mounted control system
102 housing/chassis
104 touch screen mounting member
106 docking connector
108 connector
110 upper track
112 lower track
114 bezel
116 upper groove
118 lower groove
302 pin/rod
402 portable hand-held touch screen device
404 touch screen frame
406 touch screen
408 docking connector
602 processor
604 memory
606 power circuitry
608 data/control lines
610 Ethernet
612 power line
702 bezel/frame
704 indicator lights
706 hard buttons
708 hard buttons
710 thumb pad (hard buttons)
712 hard buttons
714 speaker
716 microphone
718 camera
802 processor
804 memory
806 authentication processor
808 Zigbee interface
810 Wi-Fi interface
812 Zigbee antenna
814 Wi-Fi antenna
900 wall-mounted control system with tablet computer
902 home automation system
904 Internet
906 personal computer
908 remote control device
910 wireless Wi-Fi gateway
912 wireless Zigbee gateway
914 keypad
920 lighting equipment
922 HVAC equipment
924 security equipment
926 home theater
928 home audio

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made to the exemplary embodiments illustrated in the drawings, and specific language will be used herein to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Alterations and further modifications of the inventive features illustrated herein, and additional applications of the principles of the inventions as illustrated herein, which would occur to one skilled in the relevant art and having possession of this disclosure, are to be considered within the scope of the invention.

Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

MODE(S) FOR CARRYING OUT THE INVENTION

The present invention involves a wall-mounted control system for a portable hand-held electronic touch screen device. The wall-mounted control system enables the portable hand-held electronic touch screen device to be removeably mounted to a wall and interface with, and control, home automation, home theater, lighting, environmental, and/or security systems In various embodiments, the wall-mounted control system also augments a portable hand-held electronic touch screen device with various external manual hard buttons and/or actuators and/or indicators.

The wall-mounted control system including the portable hand-held electronic touch screen device is capable of transmitting control commands to a plurality of controllable devices, such as audio and video components, lighting controls, and HVAC controls. In one embodiment, the wall-

mounted control system transmits control commands independent of whether or not the hand-held electronic touch screen device is on, or a particular application is executing on the hand-held electronic touch screen device. In another embodiment, the hand-held electronic touch screen device executes an application that complements the intended end-use of the wall-mounted control system, such as a graphic user interface that functions as a control panel for an office or home automation system or home theater.

The wall-mounted control system, in various embodiments, utilizes communication methods known in the art to transmit control commands (e.g., key/button presses) either directly to the controllable devices or indirectly through an intermediate device. For example, the wall-mounted control system may transmit control commands through wired connections or wireless radio frequency (RF) signals.

Referring to FIGS. **1-3**, in one embodiment, illustrative isometric and orthographic views of the wall-mounted control system **100** are shown. The control system **100** includes a housing or chassis **102**, a bezel/frame **114**, and a touch screen mounting member **104**. The touch screen mounting member **104** includes an upper track **110** with an upper groove **116** and lower track **112** with a lower groove **118**. The touch screen mounting member **104** further includes a docking connector **106** and one or more auxiliary connectors **108**, such as Audio/Video, Ethernet, or phone. In various embodiments, the control system **100** is constructed of plastic, metal (e.g., stainless steel, aluminum), fiberglass, or other acceptable material known to those skilled in the art.

The housing **102** is configured to be disposed inside a wall of a room and anchored to, or supported by, a wall stud, similar to a light switch or outlet box. The bezel **114** is configured to lay flush against the wall surface, similar to a face plate of light switch. The housing **102** includes at least one opening dimensioned and arranged to accommodate various cables (routed through the wall), such as power, Ethernet, audio/video, and phone, to pass therethrough and internally connect to docking connector **106** and/or connectors **108**.

The touch screen mounting member **104** is moveable between an open position (FIG. **1**) and a closed position (FIG. **2**) by various means known to those skilled in the art. For example, in one embodiment, the mounting member **104** is moved from the closed position (FIG. **2**) to the open position (FIG. **1**) when the mounting member **104** is pushed inward (into the housing) and released. This motion actuates a two position spring member (not shown), which in response to being pushed in, moves from a first position to a second position and thereby pushes the mounting member **104**, which rotates on pin/rod **302** to the open position. To move the mounting member **104** back to the closed position, the mounting member **104** is again pushed inward against the outward force of the spring member until the spring member moves back from the second position into the first position.

The mounting member **104** is dimensioned to receive and hold a particular hand-held touch screen device. In other words, in one embodiment, the upper track **110** with the upper groove **116** and the lower track **112** with the lower groove **118** are dimensioned to receive and hold a particular size smart phone. Further, the connectors **106**, **108** are configured to electrically mate with one or more connectors disposed on the particular smart phone. In another embodiment, the upper track **110** with the upper groove **116** and the lower track **112** with the lower groove **118** are dimensioned to receive and hold a particular size tablet computer. Further, the connectors **106**, **108** are configured to electrically mate with one or more connectors disposed on the particular tablet computer.

In another embodiment, the mounting member **104** includes various speaker openings. The speaker openings are located proximate to a speaker of the particular touch screen device that is disposed in the mounting member **104**. The speaker openings prevent sound emanating from the speaker of the particular touch screen device from being blocked and muffled.

FIGS. **4** and **5** are illustrative orthographic front views of the wall-mounted control system of FIG. **3** including a portable hand-held touch screen device **402** partially and completely disposed therein. The portable hand-held touch screen device **402** includes a frame **404** and screen **406**. Referring to FIGS. **1**, **2**, **4**, and **5**, in one embodiment, in operation, a user moves the mounting member **104** from the closed position (see FIG. **2**) to the open position (see FIG. **1**) as described above. The user then takes an appropriately sized portable touch screen device **402** and orients the touch screen device **402** so that a connector **408** on the touch screen device **402** is positioned to mate with the docking connector **106**. The user then inserts and slides opposite edges of the frame **404** of the touch screen device **402** (i.e., edges that are perpendicular to the edge with the connector **408**) into the upper groove **116** of the upper track **110** and the lower groove **118** of the lower track **112** (see FIG. **4**). The user then pushes the touch screen device until the connector **408** electrically mates with the docking connector **106** (see FIG. **5**). In other embodiments, the touch screen device **402** includes additional connectors proximate to connector **408** that mate with connectors **108**. After the connector **408** is electrically mated with the docking connector **108**, and the touch screen device **402** is fully inserted into the mounting member **104**, the user moves the mounting member from the open position (FIG. **1**) to the closed position (FIG. **2**), as described above.

If the user wishes to remove the touch screen device **402** from the control system **100**, the user simply moves the mounting member **104** to the open position as described above, and pulls the touch screen device **402** in the direction opposite to the direction of insertion until the touch screen device **402** disengages the connector **106** and slides out of the upper and lower tracks **110**, **112**.

In various embodiments, the housing **102** includes therein various electronic circuitry that is necessary to connect the touch screen device **402** disposed in the touch screen mounting member **104** (and mated to the docking connector **106**) to a home automation system, security system, and/or home entertainment system.

Referring to FIG. **6**, in one embodiment, a block diagram of the electronic components and circuitry disposed in the housing **102** is shown. In this embodiment, the housing **102** includes a processor **602**, a memory **604** (e.g., RAM, ROM, EPROM), and power circuitry **606**.

The processor **602** functions as the interface between the touch screen device **402** and any systems that the touch screen device **402** is intended to control or interface with. The processor **602** is in communication with the memory **604** and the docking connector **106**. The processor **602** receives "power in" from the house or building power. The processor **602** also connects (wired) to a home or building network (e.g., Ethernet or Cresnet®). The processor **602** also receives (wired) other data/control signals, such as audio/video data, from one or more external sources.

The memory **604** is configured for storing various data, such as login/password information, user profiles, and/or user environment settings, for example. The memory **604** is also configured for storing executable programs that are either executed on the processor **602**, or download to and executed on the touch screen device **402**.

As mentioned above, the touch screen mounting member **104** includes a docking connector **106**. The docking connector **106** is configured for electrically connecting/mating to a connector (not shown) disposed on the touch screen device **402** and enables a communication and power transfer path between the circuitry in the housing **102** and the touch screen device **402**.

Still referring to FIG. **6**, the docking connector **106** includes connections for data/control **608** and network communications **610** to/from the processor **602**. Such connections between the processor **602** and the docking connector **106** include a CAN bus, Ethernet, Cresnet®, IEEE-1394 (Firewire), RS-232, RS-422, RS-485, and/or USB, or other device specific or proprietary communication protocols. The docking connector **106** also includes a power connection **712** from power circuitry **606**. In one embodiment, the power circuitry **606** includes circuitry to convert house/building line power to the appropriate voltage for powering the particular touch screen device **402**. In another embodiment, the power circuitry **606** also includes circuitry for charging a battery of the particular touch screen device **402**. In still other embodiments, power to the control system **100** and an attached touch screen device **402** is provided through power over Ethernet (POE) circuitry.

Referring to FIG. **7**, in another embodiment, the wall mounted control system includes bezel/frame **702** in place of frame **114** (see FIG. **3**). The bezel/frame **702** includes hard buttons **706**, **708**, **710**, **712**, indicator lights **704**, a microphone **716**, speakers **714**, and camera **716**. In other embodiments, the frame **702** also includes an LED or LCD display, and additional connectors such as USB, or A/V connectors. In yet other embodiments, the frame **702** includes one or more optical finger navigation buttons and/or trackballs. In still other embodiments, more or less hard buttons and indicator lights are included.

Referring to FIG. **8**, in another embodiment, a block diagram of additional/alternative electronic components and circuitry disposed in the housing **102** is shown. In this embodiment, the components and circuitry include a processor **802**, the memory **604**, and the power circuitry **606**.

The processor **802** functions as the interface between the touch screen device **402** and any systems that the touch screen device **402** is intended to control or interface with. The processor **802** includes general purpose input/output (GPIO) interfaces that are in communication with the hard buttons **706**, **708**, **710**, **712**. The processor **802** is also in communication with, and controls, the indicator lights **704**. The processor **802** is also configured to receive signals from the microphone **716** and the camera **718**, and transmit signals to the speakers **714**.

The processor **802** is also in communication with the memory **604** and the docking connector **106**. The processor **802** receives "power in" from the house or building power. In various embodiments, the processor **802** also connects (either wired or wirelessly) to a home or building network, such as Ethernet or Cresnet®. The processor **802** also receives and/or transmits (either wired or wirelessly) other data/control signals, such as audio/video data from external sources.

The memory **604** is configured for storing various data, such as login/password information, user profiles, and/or user environment settings, for example. The memory **604** is also configured for storing executable programs that are either executed on the processor **802**, or download to and executed on the touch screen device **402**. In other embodiments, the processor **802** includes an on-board memory.

As mentioned above, the touch screen mounting member **104** includes a docking connector **106**. The docking connector **106** is configured for electrically connecting/mating to a connector (not shown) disposed on the touch screen device **402** and enables a communication and power transfer path between the circuitry in the housing **102** and the touch screen device **402**.

Still referring to FIG. **8**, the docking connector **106** includes connections for data/control **608** and network communications **610** to/from the processor **802**. Such connections between the processor **802** and the docking connector **106** include a CAN bus, Ethernet, Cresnet®, IEEE-1394 (Firewire), RS-232, RS-422, RS-485, and/or USB. The docking connector **106** also includes a power connection **612** from power circuitry **606**. In one embodiment, the power circuitry **606** includes circuitry to convert house/building line power to the appropriate voltage for powering the particular touch screen device **402**. In another embodiment, the power circuitry **606** includes circuitry for charging a battery of the particular touch screen device **402**. In still other embodiments, power to the control system **100** and an attached touch screen device **402** is provided through power over Ethernet (POE) circuitry.

The components and circuitry disposed inside the housing **102** still further include either a Zigbee (IEEE-802.15.4) interface **808** and associated antenna **812** or a Wi-Fi (IEEE-802.11) interface **810** and associated antenna **814** in communication with the processor **802**, which enable the processor **802** to wirelessly connect to a home or building network (e.g., Ethernet or Cresnet®), and to transmit and receive various data and control signals, such as audio/video data, for example. In other embodiments, the processor **802** is configured to wirelessly communicate with external devices using Bluetooth (IEEE-802.15.1), infiNET™, and/or a proprietary protocol in the ultra high frequency band.

Also disposed inside the housing **102** and in communication with the processor **802** is an authentication processor **806**, which is an encryption chip licensed from Apple, Inc., that is included in devices that are officially licensed to communicate with Apple® products. Consequently, if the touch screen device **402** were an Apple® iPad™ or Apple® iPod™, then the wall-mounted control system disclosed herein would need an authentication coprocessor **402** to function correctly with the iPad or iPod. In operation, after the touch screen device **402** (i.e., iPad) was inserted into the mounting member **104** and mated with the docking connector **106**, the touch screen device **402** would interrogate the wall-mounted control system **100** to verify (by communicating with the authentication coprocessor **808**) that the control system **100** was a product officially licensed to communicate with the touch screen device **402**.

Referring to FIG. **9**, in one embodiment, a block diagram of a plurality of devices in communication with a home automation system **902** is shown. The home automation system **902** is in communication with, and controls, lighting **920**, HVAC **922**, security **924**, a home theater system **926**, and a home audio system **928**. The home automation system **902** can be configured and controlled via a personal computer **906**, a keypad **914**, a remote control device **908** via a wireless Wi-Fi gateway **910** and/or a wireless Zigbee gateway **912**, or the wall-mounted control system (with a touch screen device such as a table computer disposed therein) **900**, which is in wired or wireless communication with the home automation system **902**.

In some embodiments, the control system **900** can be used to connect to the internet **904** via the home automation system **902** through either wired or wireless communication. In other

embodiments the wireless Wi-Fi gateway **910** and the wireless Zigbee gateway **912** are combined into a single wireless gateway device.

Referring to FIGS. **7-9**, in one embodiment, one part or component of a software application/program (first application component) for controlling, or interfacing with, a home or office automation system (e.g., automation system **902**) is stored in the memory **604** or in a memory on the processor **802** and executes on the processor **802**. Additionally, another part or component of the software application (second application component) for controlling, or interfacing with, the automation system **902** resides and executes on the touch screen device **402** disposed in the touch screen mounting member **104**. The first and second components of the automation system control application execute independent of any other application that may be executing on the touch screen device **402**. Further, the first and second application components execute independently of each other.

The first application component executing on the processor **802** interprets input (actuations) from the hard buttons **606**, **608**, **610**, **612**, converts the hard button actuations into digital signals, and transmits the digital signals from the actuated hard button (e.g., pressed) to the touch screen device **402**. The processor **802** also transmits the control instructions that correspond to the button actuations to the automation system **902** or to a particular external device in communication with the automation system via a wired or wireless communication link. The first application component also provides the signals that are used to control (i.e., turn on/off) the indicator lights **604**.

In various embodiments, at least some of the hard buttons **606**, **608**, **610**, **612** are dedicated control buttons with fixed functions, such as volume up/down, channel up/down, lights on/off, home, guide, info, exit, and/or mute, for example. These hard buttons execute their respective control functions upon being pressed by a user regardless of the state of the touch screen device **402**. In other words, these hard buttons execute their respective control functions without the user having to navigate through control menus, or without the touch screen device **402** being involved in any way. The dedicated control buttons of the control system will still execute their assigned/programmed functions even when the touch screen device **402** is not disposed in the touch screen mounting member **104**.

Other of the hard buttons **606**, **608**, **610**, **612**, are user configurable to control various external devices (e.g., stereo, temperature, light dimmer, etc) and/or system control functions. In some embodiments, one or more of the other hard buttons are programmed to interact with a graphical user interface displayed on the screen **406** of the touch screen device **402**, or control another application executing on the touch screen device **402**.

The second application component provides the optional graphical user interface displayed on the touch screen device **402**, and includes soft buttons used for controlling additional components, devices, and/or functions of the automation system **902**. The second application component receives input (digital signals from hard button actuation) from the first application component, as described above. The second application component also transmits input (digital signals from soft button actuation) to the first application component, which in turn transmits the corresponding control instructions to the automation system **902** or to a particular external device in communication with the automation system via a wired or wireless communication link.

In one embodiment, during an initial device configuration and set-up operation, the touch screen device **402** is inserted into the touch screen mounting member **104** and mated with the docking connector **106**. The processor **802** then establishes a communication link between the processor **802** and the touch screen device **402**. The processor **802** retrieves the second application component from memory **604**, on-board processor memory, or from remote storage via the wired or wireless network link. The processor **802** then installs the second application component on the touch screen device **402**. In other embodiments, the second application component is installed directly onto the touch screen device **402** by means known to those skilled in the art.

When a user wishes to control a function of a device that is in communication with the automation system **902**, such as muting the audio of the home theater **926**, for example (see FIG. **9**), the user simply presses the appropriate hard button **606**, **608**, **610**, **612** (or soft button of a graphical user interface) that is dedicated to, or programmed for, muting the audio. If a hard button is pressed, the processor **802** executing the first application component captures and transmits (wired or wirelessly) the digital signal corresponding to the mute audio command created by the user pressing the mute hard button to the automation system **902**, which in turn transmits the mute audio command to the home theater **926**. If a soft button is pressed, the processor of the touch screen device **402** executing the second application component captures and transmits (via docking connector **106**) the digital signal corresponding to the mute command to the first application component, which then transmits the digital signal to the automation system **902**, which in turn transmits the digital signal to the home theater **926**.

Upon receiving the mute audio command, the home theater mutes the audio and transmits a response or status signal to the automation system **902**. The automation system **902** then transmits (wired or wirelessly) the response/status signal to the processor **802**. The processor **802** uses the received response/status signal to illuminate an indicator light **604** corresponding to audio muting being activated. Alternatively, the first application component executing on the processor **802** transmits the response/status signal to the second application component (executing on the touch screen device **402**), which provides an appropriate indicator on the graphical user interface displayed on the touch screen device **402**.

In other embodiments, the microphone **616**, the speakers **614**, and the camera **618** are used for an audio/video intercom system within the home or building. Alternatively, these components can be used for web-based phone calls or video chat. In another embodiment, the camera **618** and microphone **616** are used to remotely surveil the particular room in which the system **100** (and connected touch screen device) are located, as part of a network (wired or wireless) or web based security system.

In yet another embodiment, the control system **100** is configured to stream audio/video from the touch screen device disposed therein. The audio/video from the touch screen device is either accessed by the processor **802** over a connection to a USB port disposed on the touch screen device, over a digital interface such as an HDMI or DisplayPort, or via the docking connector **108**. In some embodiments, the processor **802** then encodes the audio/video into an MPEG streaming format, encodes the data steam in accordance with HDCP 2.0, and transmits the audio/video to other remote devices over Ethernet, Wi-Fi, Zigbee, or Cresnet using a protocol such as AVB, or other audio/video transmission protocol known to those skilled in the art. This feature enables the touch screen device to function as an audio/video server or to access online content and stream such content to other remote devices in the house or building.

In still other embodiments, the wall-mounted control system disclosed herein is configured to receive, and establish electrical communication with, a hand-held electronic touch screen device that is disposed within a protective enclosure (e.g., clam shell) that includes at least one or more dedicated hard buttons. Examples of such an enclosure are described in U.S. patent application Ser. No. 12/960,791, and U.S. patent application Ser. No. 13/076,716, the entireties of which are incorporated herein by reference.

LIST OF ACRONYMS USED IN THE DETAILED DESCRIPTION OF THE INVENTION

The following is a list of the acronyms used in the specification in alphabetical order.

AV audio visual
AVB audio video bridging
CAN controller area network (data transfer protocol)
CPU central processing unit
DVD digital video disc
EPROM electronically programmable read only memory
GPIO general purpose input/output
HDCP high-bandwidth digital content protection
HDMI high definition multimedia interface
HVAC heating, ventilation, and air conditioning
I^2C inter-integrated circuit (digital bus)
IEEE Institute of Electrical and Electronics Engineers
PC personal computer
POE power over Ethernet
RAM random access memory
ROM read only memory
SPI serial peripheral interface
UHF ultra-high frequency
USB Universal Serial Bus

ALTERNATE EMBODIMENTS

Alternate embodiments may be devised without departing from the spirit or the scope of the invention. For example, in alternative embodiments the first control button and the second control button may be joysticks.

INDUSTRIAL APPLICABILITY

To solve the aforementioned problems, the present invention is a unique portable smart touch screen device disposed in, and in communication with, a clam shell enclosure that includes one or more dedicated hard buttons, processing, and communications.

What is claimed is:

1. A wall-mounted control system for a portable touch screen device, the control system comprising:

a housing configured for being mounted on a wall;

a touch screen mounting member comprising a first track and a second track parallel to the first track, the first track and the second track each defining a respective opening at one respective end, the first track and the second track being dimensioned and arranged for slideably receiving opposite edges of the portable touch screen device through the respective openings at the respective ends along an axis parallel to the first track and second track, the touch screen mounting member being coupled to the housing and moveable about an axis perpendicular to the first track and second track between a first position disposed in the housing and a second position extending partially out of the housing and configured to releaseably hold the portable touch screen device between the first track and the second track in a position enabling direct physical access to the portable touch screen device when the touch screen mounting member is in either the first position or the second position; and

a docking connector disposed on a wall perpendicular to the first track and the second track and configured for electrically mating with the portable touch screen device.

2. The wall-mounted control system of claim **1**, wherein the touch screen mounting member defines a cavity dimensioned and arranged to provide fingertip access to the rear side of the portable touch screen device.

3. The wall-mounted control system of claim **1**, further comprising a bezel disposed on the housing.

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